

### REMARKS/ARGUMENTS

Claims 21-26 are pending in the application and all the claims stand rejected.

The Examiner's attention is respectfully directed to paragraph numeral 0013 of the instant application which describes a prior art method of depositing a film or seed layer over an under bump metallurgy of a semiconductor wafer. The semiconductor wafer is placed in a wafer jig having an opening therein exposing an upper surface of the semiconductor wafer. The jig is dipped in a plating solution so that the entire wafer is submerged below the plating solution. However due to the small width of the opening in the photoresist layer overlying the under bump metallurgy and the aspect ratio, it is difficult to completely plate the entire surface of the under bump metallurgy exposed by the opening in the photoresist layer. This is the problem that the present inventors were facing.

Applicant's solution to the problem includes the instant invention involving an apparatus, and a method performed using the apparatus. The Examiner's attention is respectfully directed to paragraph 0047 of the instant application. Applicant's solution includes utilizing the apparatus of the instant claims to pretreat a semiconductor wafer with a wetting solution discharged by the spray nozzles of the apparatus. After the pretreatment, a semiconductor jig having the semiconductor wafer therein is dipped in an electroplating solution so that, for example, a first seed layer may be plated over the under bump metallurgy. Using the present invention apparatus

and method, the first seed layer extends to the sides 68 of the photoresist that define the opening 26 to completely cover the exposed surface of the under bump metallurgy 18 without any voids as shown in Figure 7.

None of the references relied on by the Examiner recognize the problem that the inventor was facing. None of the references of record recognize the claimed apparatus as a solution to the problem the inventors were facing. No prima facie case of obviousness can be established using the references relied on by the Examiner.

Claims 21 and 22 had been rejected under 35 U.S.C. § 103(a) as being unpatentable over either Germany '272, Abe et al., or Mertens et al. in view of Czaja et al. With respect to Germany '272, the Examiner is relying on the Abstract alone to support the rejection. This is improper. The Examiner's attention is respectfully directed to MPEP 706.02 II which states:

Prior art uncovered in searching the claimed subject matter of a patent application often includes English language abstracts of underlying documents, such as technical literature or foreign patent documents which may not be in the English language. When an Abstract is used to support a rejection, the evidence relied upon is the facts contained in the Abstract, not additional facts that may be contained in the underlying full text document. Citation of and reliance upon an Abstract without citation of and reliance upon the underlying scientific document is generally inappropriate where both the Abstract and the underlying document are prior art. See *Ex Parte Jones*, 62 U.S.P.Q.2d 1206, 1208 (Board of Patent Appeals and Interferences 2001) (unpublished).

To determine whether both the Abstract and the underlying document are prior art, a copy of the underlying document must be obtained and analyzed. If the document is in a language other than English and the Examiner seeks to rely on that document, a translation must be obtained so that the record is clear as to the precise facts the Examiner is relying upon in support of the rejection. The record must also be clear as to whether the Examiner is relying upon the Abstract or the full text document to support a rejection. The rationale for this is several fold. It is not uncommon for a full text document to reveal that the document fully anticipates an invention that the Abstract renders obvious at best. The converse may also be true, that the full text document will include teachings away from the invention that will preclude an obviousness rejection under 35 U.S.C. § 103, when the Abstract alone appears to support the rejection....

Applicant maintains that Applicant is entitled to a full translation in English of Germany '272 as well as Kobayashi JP 362281430A (discussed hereafter) if the Examiner wishes to maintain any rejection using either of those two references. Furthermore, should the Examiner provide Applicant with a full translation of the references, Applicant requests the next Office Action not be made final so that Applicant may be given a fair opportunity to review the reference in total and provide a response. The Examiner has not provided such an opportunity to the Applicant through the Office Action of April 27, 2004, and therefore any rejections utilized in those references are fatally defective.

With respect to Germany '272, the Abstract states that "the washing equipment involves a nozzle (5) for spraying fine, frozen particles..." Applicant maintains that the Abstract is non-

enabling because the Abstract fails to disclose how the frozen particles are sprayed out of the washing equipment nor the chemical make-up of the frozen particles. Furthermore, the Examiner has failed to describe how an apparatus which sprays frozen particles would suggest Applicant's now claimed invention. Germany '272 does not recognize the problem facing the present inventors nor does it suggest a solution thereto. It would appear that the Examiner is relying on the drawings of Germany '272 to support the rejection. However, the drawing must suggest the claimed invention as a solution to the problem solved by the inventors. *In re Meng et al.*, 181 U.S.P.Q. 94 (CCPA 1974). Furthermore, although Applicant's apparatus may be simple in hindsight, the Examiner's attention is respectfully directed to *In re Hortman*, 121 U.S.P.Q. 218, 219 (CCPA 1959) which states "For, though the structure may be a simple expedient when the novel concept is realized, the structure may not be obvious to those skilled in the art where the prior art has failed to suggest the problem or conceive of the idea of its elimination." Neither Germany '272 individually or in combination with any of the other references of record, recognizes the problem that the present inventor faced nor does it suggest the idea for its elimination.

Abe et al. '392 discloses an automatic photomask or reticle washing and cleaning system wherein a photomask is moved past a plurality of nozzles which spray a cleaning solution such as ammonia water (see column 9, lines 24-35). Abe et al. is not directed to solving the problem of plating through a relatively narrow opening in a photoresist layer. Nor does Abe et al. address the problem of making an apparatus sufficient to pretreat a semiconductor substrate with a opening in a photoresist mask in a manner to allow the semiconductor substrate to be plated

through the opening in the photoresist mask. No prima facie case of obviousness can be established over Abe et al. individually or in combination with any of the other references of record.

With respect to Mertens et al., Applicant did not receive a copy of this reference, and the reference does not appear on the Notice of References Cited attached to the Office Action. Applicant respectfully requests a copy of the reference and the opportunity to address the patentability of Applicant's invention over Mertens et al. individually or in combination with any other reference. Applicant respectfully requests that the next Office Action not be made final if the Examiner maintains the rejection and provides a copy of the reference or a patent number so that Applicant can retrieve the reference from public sources. Applicant maintains no prima facie case of obviousness has been established with respect to Mertens et al. individually or in combination with any other reference of record.

Czaja et al. discloses a vertical photoresist developer for processing a variety of printed circuit boards carried on a processing cassette. Czaja et al. does not recognize a problem associated with plating through an opening in a photoresist layer. Nor does the reference recognize a need to pretreat a semiconductor device with an opening in a photoresist layer prior to plating a seed layer or electrically conductive material through the opening in the photoresist layer onto an under bump metallurgy. Nor does Czaja et al. recognize a need for an apparatus including a plurality of nozzles having the ability to spray wetting solution particles having a

diameter less than 100 micrometers as a solution to the problem of plating through an opening in a photoresist layer of a semiconductor device.

Since none of the references of record relied in this rejection, that is, Germany '272, Abe et al., Mertens et al. nor Czaja et al. recognize the problem facing the inventor nor the solution thereto, the rejection fails to establish a prima facie case of obviousness.

Claim 23 was rejected under 35 U.S.C. § 103(a) as being unpatentable over either Germany '272, Abe et al. or Mertens et al. in view of Czaja et al. as applied to claim 21 and further in view of either Kobayashi et al. or Japan '430. Applicant's comments regarding Germany '272, Abe et al., Mertens et al. and Czaja above are hereby repeated. Neither Kobayashi et al. or Japan '430, individually or in combination with the other references overcome the deficiencies of the primary references as outlined by Applicant above. Again, Applicant maintains that the Examiner has only cited the Abstract of Kobayashi to support the rejection which is improper. Applicant is entitled to a translation and requests that the Examiner provide a complete English translation of the entire reference for the same reasons cited with respect to the failure to provide a complete English translation of Germany '272 cited above. Kobayashi is directed to an apparatus for ultrasonic cleaning of a wafer. The reference does not recognize a need to pretreat a semiconductor wafer in order to plate through an opening in a photoresist layer nor does it recognize the need for an apparatus to accomplish the same utilizing nozzles to spray a wetting solution particle having a diameter less than 100 micrometers. Similarly, Japan '430 is also directed to an apparatus for ultrasonic cleaning of a wafer. The

reference does not recognize a problem associated with plating through an opening in the photoresist layer down to an under bump metallurgy of a semiconductor wafer, nor does the reference recognize the need for an apparatus to pretreat a semiconductor wafer utilizing nozzles for spraying wetting solution particles having a diameter less than 100 micrometers.


Claims 24-26 had been rejected under 35 U.S.C. § 103(a) as being unpatentable over Germany '272, Abe et al., or Mertens et al. in view of Czaja et al. as applied to claim 21 and further in view of either Kanno (U.S. Patent No. 5,934,566) or Fishkin et al. Applicant's comments regarding Germany '272, Abe et al., Mertens et al. and Czaja et al. as stated above are hereby repeated. Neither Kanno nor Fishkin et al., individually or in combination with other references, overcome the deficiencies of the primary references as Applicant has set forth above. Kanno et al. is directed to an apparatus for removing contamination on a substrate. The Examiner's attention is respectfully directed to column 9, lines 9-16 which indicates that the apparatus operates utilizing a pressurized tank from which wetting solution is sprayed onto the surface from a nozzle. The wafer is rotated so that the washing solution is uniformly sprayed onto the surface of the wafer and so that the adhesion force between the wafer and the contamination (such as a small particle) on the surface is weakened. Then pure water and gas are mixed in the nozzle. The pure water is jetted out onto the surface of the wafer in the form of a droplet. Applicant maintains that a person of ordinary skill in the art would not be motivated to modify Kanno or combine it with the primary references as proposed by the Examiner because to do so one would lose the advantage associated with rotating the surface of the wafer to uniformly spray the surface of the wafer with water as taught by Kanno et al. No prima facie obviousness

can be established utilizing Kanno individually or in combination with any of the other references of record.

Fishkin et al. is directed to an apparatus for cleaning a substrate which includes a source of pressurized carrier gas and a body of cleaning agent in liquid form. The cleaning agent is sprayed onto the substrate through a plurality of nozzles. Fishkin et al. does not recognize a problem associated with plating through an opening in a photoresist layer of a semiconductor substrate. Nor does Fishkin et al. recognize a need to pretreat a substrate having an opening in a photoresist layer in order to plate through the opening in the photoresist layer. Fishkin et al. does not, individually or in combination with the other references, recognize the need for an apparatus for pretreating a substrate with an opening in a photoresist layer wherein the apparatus includes a plurality of nozzles capable of spraying wetting solution particles having a diameter less than 100 micrometers. No prima facie case of obviousness has been established with respect to Fishkin et al., individually or in combination with any of the other references of record.

In view of the above amendments and remarks, Applicant respectfully requests reconsideration and allowance of all the claims now in the case.

Respectfully submitted,

  
Randy Tung  
Reg. No. 31,311  
248-540-4040